

Chapter Three: Contents

(Routes – 15 October 2001 – LA-UR 01-5714 – Portland Study Reports)

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Chapter Three—Routes

1. NETWORK

For efficiency reasons, the TRANSIMS network (see Volume Two (*Study Setup: Parameters and Input Data*), Chapter One (*Network*)) is converted to an internal Route Planner network. The general documentation contains details about this transformation, and can be found on the TRANSIMS web site <http://transims.tsasa.lanl.gov>. There are 475,246 nodes and 650,994 links in the TRANSIMS network; and 506,138 nodes, 1,104,177 links, and 3,287,972 edges in the internal Route Planner network. The internal edges are the network over which the actual routing takes place. Table 1 breaks down these numbers by layer for the internal Route Planner network.

Table 1. Internal Route Planner network by layer.

Layer	Nodes	Links	Edges
Street	100511	244748	249222
Parking	121503		722907
Activity	243423	829180	2285594
Bus	9771		
Light Rail	56		
Route	30874	30249	30249
<i>Total</i>	<i>506138</i>	<i>1104177</i>	<i>3287972</i>

2. PLAN FILES

There are a total of seven individual plan sets that make up a particular route set: four Itinerants (AM, Midday, PM, Rest), Trucks, Transit, and Population. Only the population, which may be split into multiple files, is generated more than once. The Transit plan set is not generated by the Route Planner at all, but created from the transit routes. The sizes of each plan set in RS-7 and RS-19 are shown in Table 2 and **Table 3**.

Table 2. Plan set sizes – RS-7.

	Bytes	GB	Trips
AM	34767533	.03	32716
Mid	123345438	.11	114723
PM	33427866	.03	33531
Rest	26524411	.02	24987
Trucks	53326331	.04	41993
Transit	9132414	.01	9429
Population	3600500835	3.35	
<i>Total</i>	<i>3881024828</i>	<i>3.61</i>	

Table 3. Plan set sizes – RS-19.

	Bytes	GB	Trips
AM	34767533	.03	32716
Mid	123345438	.11	114723
PM	33427866	.03	33531
Rest	26524411	.02	24987
Trucks	53326331	.04	41993
Transit	9132414	.01	9429
Population	4536471783	4.22	
<i>Total</i>	<i>4816995776</i>	<i>4.48</i>	

3. ANOMALIES

Anomalies occur when a problem is encountered while generating a route for a traveler. An anomaly can either be a warning or an error. A warning indicates that there may be a problem with a route, but the route is still written to the plan file, and the rest of the traveler's trips continue to be planned. The most common warnings are trip lengths that cause the time for an activity to fall outside of the range specified in the activity file. An error indicates that a route could not be created. Any further trips for that traveler are not planned. The most common error is that a path through the network either cannot be found or takes too long. Table 4 shows the anomalies reported for route sets RS-7 and RS-19. Table 5 and Table 6 break down the errors by travel mode for RS-7 and RS-19. The percentage error is the percentage of errors for trips of that mode, based on the total trips by mode from the activity file.

Table 4. Anomaly summary.

	AM	Mid	PM	Rest	Trucks	RS-7	RS-19
Total Problems	32717	114724	33532	24989	42009	2978799	496145
Errors	0	0	0	0	0	79919	13175
No Path Exits	0	0	0	0	0	3179	8760
Trip Time	0	0	0	0	0	3559	1016
Leg Time	0	0	0	0	0	56784	0
Too Many Nodes	0	0	0	0	0	4342	0
Pass Very Late	0	0	0	0	0	12055	3399
Warnings	32717	114724	33532	24989	42009	2898880	479923
Invalid Time Start	32716	114723	33531	24987	41997	1837822	240839
Stop	0	0	0	0	0	82196	27789
Duration	0	0	0	0	0	321084	57394
Driver Late	0	0	0	0	0	139240	54833
Pass Late	0	0	0	0	0	512753	98038
Parking Location	1	1	1	2	12	5785	1030

Table 5. RS-7 errors by mode.

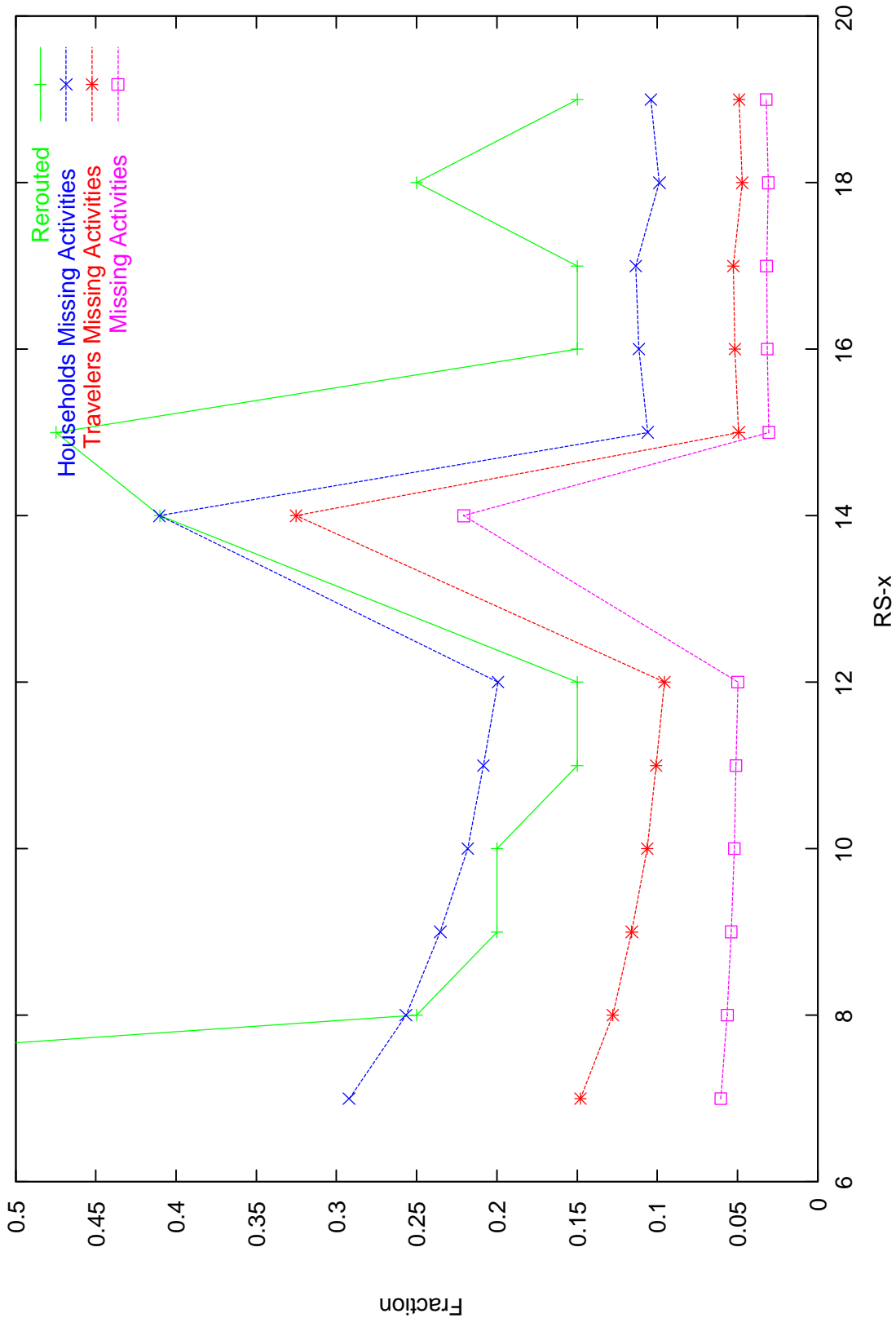
Mode	cw	w	wiw	wlw	wtw	wkw	wKw	Total
Path	1411	1363	56	84	265	0	0	3179
Trip	0	3478	4	1	76	0	0	3559
Leg	0	32401	194	6926	17263	0	0	56784
Max Node	0	0	0	0	4342	0	0	4342
V Late	12055	0	0	0	0	0	0	12055
Total	13466	37242	254	7011	21946	0	0	79919
Trips	6079443	449174	48640	28200	157042	239621	183114	7185234
% Errors	0.22	8.29	0.52	24.86	13.97	0.00	0.00	1.11

Table 6. RS-19 errors by mode.

Mode	cw	w	wiw	wlw	wtw	wkw	wKw	Total
Path	1274	1296	27	735	3885	0	0	7217
Trip	0	1001	5	0	9	0	0	1015
Leg	0	0	0	0	0	0	0	0
Too Late	0	0	0	0	0	0	0	0
Max Node	0	0	0	0	0	0	0	0
V Late	3399	0	0	0	0	0	0	3399
Total	4673	2297	32	735	3894	0	0	11631
Trips by Mode	6079443	449174	48640	28200	157042	239621	183114	7185234
% Errors	0.08	0.51	0.07	2.61	2.48	0.00	0.00	0.16

The following figure shows how the number of unplanned activities changed in the population routes from RS-7 to RS-19.

- *Households Missing Activities* is the fraction of all households in the population in which one or more activities were not planned.
- *Travelers Missing Activities* is the fraction of all travelers in the population in which one or more activities were not planned.
- *Missing Activities* is the fraction of all population activities that were not planned.
- *Rerouted* is the fraction of households that were rerouted on each iteration.



4. EXECUTION TIME

The execution time for creating the pieces of RS-7 is shown in Table 7. Many of the plan sets were created using multiple processors. The *CPU Seconds* and *CPU Hours* rows refer to the time it would have taken to run on one dual-CPU node. *Elapsed Seconds* and *Elapsed Hours* is the actual time taken using the number of Nodes and CPUs shown.

Table 7. Summary of execution time.

	AM	Mid	PM	Rest	Truck	Population	Total
CPU Seconds	48126.6	596130.5	52161.8	39916.6	153847.4	3707824	4598006.9
CPU Hours	13.4	165.6	14.5	11.1	42.7	1030	1277
Elapsed Seconds	24063.3	74516	26080.9	19958.3	76923.7	30899	
Elapsed Hours	6.7	20.7	7.2	5.5	21.4	8.6	
Nodes	1	4	1	1	1	60	68
CPUs	2	8	2	2	2	120	136